



## SECTION 1049

### PRECAST CONCRETE BOX CULVERTS

**1049.1 Scope.** These specifications cover precast concrete box culverts.

**1049.2 Acceptance.** The basis of acceptance will be in accordance with AASHTO M 259 or AASHTO M 273, unless otherwise specified.

**1049.3 Material.**

**1049.3.1 Cement.** Cement shall be in accordance with [Sec 1019](#).

**1049.3.2 Fly Ash.** Fly ash shall be in accordance with [Sec 1018](#).

**1049.3.3 Ground Granulated Blast Furnace Slag.** Ground granulated blast furnace slag shall be in accordance with the requirements of [Sec 1017](#).

**1049.3.4 Aggregate.** Fine and coarse aggregate for the concrete mixture shall be in accordance with [Sec 1005](#), except the requirements for gradation and percent passing the No. 200 (75  $\mu$ m) sieve will not apply.

**1049.3.5 Steel Reinforcement.** Reinforcement shall be in accordance with [Sec 1036.3](#).

**1049.3.6 Concrete Mixture.** Aggregate shall be sized, graded, proportioned and thoroughly mixed in such proportions of cement and water as will produce a homogeneous concrete mixture of such quality that the units will conform to the test and design requirements. Admixtures or blends may be used with approval from the engineer. The proportion of Portland cement in the mixture shall be no less than 470 pounds per cubic yard (280 kg/m<sup>3</sup>) of concrete. Cement may be replaced by GGBFS in accordance with [Sec 501](#). Fly ash may be used to replace cement in accordance with [Sec 501](#), except approved Class C or F fly ash may be substituted for a maximum of 25 percent of Type I or II cement on an equivalent weight (mass) basis.

**1049.4 Design.**

**1049.4.1** Except as otherwise specified herein, precast concrete box sections for the culvert shall be in accordance with AASHTO M 259 for culverts with 2 feet (600 mm) or more of cover, or AASHTO M 273 for culverts with less than 2 feet (600 mm) of cover, with both subject to HS20 live loading, Table 1.

**1049.4.2** Substituted precast concrete box culvert sections shall be designed for the earth cover shown on the plans for the cast-in-place box culvert, and shall be equal in height and cross sectional area or as approved by the engineer.

**1049.4.3** The manufacturer may request approval of modified designs which differ from the designs in AASHTO M 259 or AASHTO M 273. The request for such modified or special designs shall fully describe any deviations from those standards, including a drawing showing wall thickness, concrete design strength, the type, size and placement of reinforcement, and inside or outside dimensions of both of the box sections.

**1049.4.4** The minimum barrel length for box or end section shall be 2 feet (600 mm).

**1049.4.5** End sections may be precast or cast-in-place. If precast, the barrel, floor and wing walls shall be cast as an integral unit. In either case, the end sections shall be constructed to the same dimensions, shapes, and with the same reinforcement as shown on the plans for cast-in-place culvert.

**1049.4.6** Segmented end sections may be provided, but will be considered a modified design and will require approval as such.

**1049.4.7** Toe walls shall be provided on both the upstream and downstream ends as shown on the plans, and may be cast-in-place or precast. Precast toe walls shall be connected to the end section floor.

**1049.5 Manufacture.**

**1049.5.1** Curing shall be in accordance with [Sec 1026](#) until the concrete has developed the specified compressive strength.

**1049.5.2** Hot or cold weather concreting and concrete testing equipment shall be in accordance with [Sec 703](#).